

AHRQ Comparative Effectiveness Review Surveillance Program

CER # 30:

Comparative Effectiveness of Pain Management Interventions
for Hip Fracture

Original release date:

May 2011

Surveillance Report 1st Assessment: March, 2012

Surveillance Report 2nd Assessment: October, 2012

Key Findings:

- There is sparse new literature on pain management interventions for hip fracture.
- Overall, expert opinion and review of the literature are consistent.

These findings were unchanged from the 1st assessment

Summary Decision

This CER's priority for updating is **Low** (This is unchanged from the last assessment)

Authors:

Jennifer Schneider Chafen, MS, MD

Sydne Newberry, PhD

Margaret Maglione, MPP

Aneesa Motala, BA

Roberta Shanman, MLS

Paul Shekelle, MD, PhD

None of the investigators has any affiliations or financial involvement that conflicts with the material presented in this report.

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The authors gratefully acknowledge the following individuals for their contributions to this project:

Subject Matter Experts

Jeffrey Fudin, BS, Pharm.D, D.A.A.P.M., Diplomate, A.A.P.M

NovaPain Associates

Delmar, New York

Kenneth J. Koval, MD

Department of Orthopaedics at Orlando Regional Medical Center

Orlando, Florida

Jay R. Lieberman, MD

University of Connecticut Health Center

Farmington, Connecticut

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Effectiveness of Pain Management Interventions for Hip Fracture

1. Introduction

Comparative Effectiveness Review (CER) #30, Comparative Effectiveness of Pain Management Interventions for Hip Fracture was originally released in May 2011.¹ It was therefore due for a surveillance assessment in November, 2011 and the first assessment of CER #30 was submitted in March, 2012. The second assessment was due to start the re-assessment in September, 2012 and was completed in October, 2012.

2. Methods

2.1 Literature Searches

Using the search strategy employed for the original report, we conducted a limited literature search of Medline. Initially, this search included five high-profile general medical interest journals (Annals of Internal Medicine, British Medical Journal, Journal of the American Medical Association, Lancet, and the New England Journal of Medicine) and six specialty journals (Osteoporosis International Journal, Journal of the American Geriatrics Society, Anesthesia and Analgesia, Regional Anesthesia and Pain Medication, Emergency Medicine, and Anesthesiology). The specialty journals were those most highly represented among the references for the original report. The search resulted in too little tiles to review. Thus, a full search was undertaken to ensure no relevant studies were missed. The first assessment search covered 2008 to November 10, 2011. The second assessment search covered 2011 to September 13, 2012. Appendix A includes the search strategy.

2.2 Study selection

In general we used the same inclusion and exclusion criteria as the original CER.

2.3 Expert Opinion

For the first assessment we shared the conclusions of the original report with 14 experts in the field including the original project leader, suggested field experts, original technical expert panel (TEP) members, and peer reviewers) for their assessment of the need to update the report and their recommendations of any relevant new studies; four subject matter experts completed the questionnaire matrix for the first assessment. For the second assessment, we reached out to the four experts with a modified matrix that included the experts prior responses. Three experts responded back. Appendix C shows the questionnaire matrix that was sent to the experts.

2.4 Check for qualitative and quantitative signals

After abstracting the study conditions and findings for each new included study into an evidence table, we assessed whether the new findings provided a signal according to the Ottawa Method and/or the RAND Method suggesting the need for an update. The criteria are listed in the table below.^{2,3}

	Ottawa Method
	Ottawa Qualitative Criteria for Signals of Potentially Invalidating Changes in Evidence
A1	Opposing findings: A pivotal trial or systematic review (or guidelines) including at least one new trial that characterized the treatment in terms opposite to those used earlier.
A2	Substantial harm: A pivotal trial or systematic review (or guidelines) whose results called into question the use of the treatment based on evidence of harm or that did not proscribe use entirely but did potentially affect clinical decision making.
A3	A superior new treatment: A pivotal trial or systematic review (or guidelines) whose results identified another treatment as significantly superior to the one evaluated in the original review, based on efficacy or harm.
	Criteria for Signals of Major Changes in Evidence
A4	Important changes in effectiveness short of “opposing findings”
A5	Clinically important expansion of treatment
A6	Clinically important caveat
A7	Opposing findings from discordant meta-analysis or nonpivotal trial
	Quantitative Criteria for Signals of Potentially Invalidating Changes in Evidence
B1	A change in statistical significance (from nonsignificant to significant)
B2	A change in relative effect size of at least 50 percent
	RAND Method Indications for the Need for an Update
1	Original conclusion is still valid and this portion of the original report does not need updating
2	Original conclusion is possibly out of date and this portion of the original report may need updating
3	Original conclusion is probably out of date and this portion of the original report may need updating
4	Original conclusion is out of date

2.5 Compilation of Findings and Conclusions

For this assessment we constructed a summary table that included the key questions, the original conclusions, and the findings of the new literature search, the expert assessments, and any FDA reports that pertained to each key question. To assess the conclusions in terms of the evidence that they might need updating, we used the 4-category scheme described in the table above for the RAND Method.

In making the decision to classify a CER conclusion into one category or another, we used the following factors when making our assessments:

- If we found no new evidence or only confirmatory evidence and all responding experts assessed the CER conclusion as still valid, we classified the CER conclusion as still valid.

- If we found some new evidence that might change the CER conclusion, and /or a minority of responding experts assessed the CER conclusion as having new evidence that might change the conclusion, then we classified the CER conclusion as possibly out of date.
- If we found substantial new evidence that might change the CER conclusion, and/or a majority of responding experts assessed the CER conclusion as having new evidence that might change the conclusion, then we classified the CER conclusion as probably out of date.
- If we found new evidence that rendered the CER conclusion out of date or no longer applicable, we classified the CER conclusion as out of date. Recognizing that our literature searches were limited, we reserved this category only for situations where a limited search would produce prima facie evidence that a conclusion was out of date, such as the withdrawal of a drug or surgical device from the market, a black box warning from FDA, etc.

2.6 Determining Priority for Updating

We used the following two criteria in making our final conclusion for this CER:

- How much of the CER is possibly, probably, or certainly out of date?
- How out of date is that portion of the CER? For example, would the potential changes to the conclusions involve refinement of original estimates or do the potential changes mean some therapies are no longer favored or may not exist? Is the portion of the CER that is probably or certainly out of date an issue of safety (a drug withdrawn from the market, a black box warning) or the availability of a new drug within class (the latter being less of a signal to update than the former)?

3. Results

3.1 Search

1st assessment: The literature search identified 481 titles. After title and abstract review, we further reviewed the full text of 21 journal articles. The remaining 456 titles were rejected because they were editorials, letters, or did not include topics of interest. Four further articles were reviewed at the suggestion of the experts. Through literature searches and expert recommendations, 25 articles went on to full text review. Of these, 24 were rejected because they were non-systematic reviews, did not include a comparison of interest, or did not evaluate pain management in a population of people with a hip fracture. Thus, one article was abstracted into an evidence table (Appendix B).⁴ One technical expert provided a blanket "no new evidence, no need for updating" across the whole set of conclusions, and did not respond on a conclusion-by-conclusion basis. Therefore, the table includes votes only for those 3 technical experts that did provide assessments on a conclusion-by-conclusion basis.

2nd assessment: 165 titles were identified from the literature searches covering 2011-September 13, 2012. We followed the same inclusion/exclusion criteria from the 1st assessment.

Four articles were accepted for full text review of which 2 were included for the re-assessment.^{5,6}

The experts did not identify any new articles.

Appendix B includes the cumulative data for the 3 included studies.⁴⁻⁶ The two new studies are bolded.

3.2 Expert Opinion

2nd assessment: All three experts thought there was no new evidence for KQ's 1-4.

3.3 Identifying qualitative and quantitative signals

Table 1 shows the original key questions, the conclusions of the original report, the results of the literature and drug database searches, the experts' assessments, the recommendations of the Southern California Evidence-based Practice Center (SCEPC) regarding the need for update, and qualitative signal.

Table 1: Summary Table

Conclusions From CER Executive Summary	RAND Literature Search	FDA/Health Canada/ MHRA (UK)	Expert Opinion EPC Investigator Other Experts	Conclusion from SCEPC	Conclusions of validity of CER conclusion(s)	
					Prior Assessment	Cumulative Assessment
SYSTEMIC ANALGESIA						
Three RCTs (n = 214) evaluated different types of systemic analgesia. The mean age ranged from 77.2 to 78.5 years; most patients were female.					Up-to-date	Up-to-date
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
All three trials reported acute pain. Acute pain was measured using the 10cm Visual Analogue Scale (VAS); the mean baseline measure was 6.5cm. One trial (n = 90) comparing parecoxib intravenous (IV) versus diclofenac intramuscular (IM) ± meperidine IM found a significant difference in favor of parecoxib IV (MD -0.70; 95% confidence interval [CI] -1.04, -0.36; p <0.0001). The second trial (n = 30) comparing intrathecal isotonic clonidine versus intrathecal hypertonic clonidine reported a significant difference in favor of isotonic clonidine (MD -1.69; 95% CI -2.01, -1.37; p <0.00001). The third trial (n = 94) comparing lysine clonixinate versus metamizole found no	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert thought there was new evidence and cited 2 distinct studies (but neither had results isolated in populations of patients with a hip fracture) September 2012 assessment: Three experts thought there was no new data.	Conclusion is still valid and this portion of the CER does not need updating. September 2012 assessment: Conclusion unchanged from previous update.	Up-to-date	Up-to-date

significant difference (MD -0.43; 95% CI -1.30, 0.44; p = 0.33). The strength of the evidence was rated as insufficient.						
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
<i>Additional pain medication use</i> was reported in one trial comparing lysine clonixinate versus metamizole and reported no significant difference between groups (OR 3.00; 95% CI 0.30, 29.94; p = 0.35). <i>Delirium</i> was reported in one trial comparing lysine clonixinate versus metamizole and found no significant difference (OR 0.96; 95% CI 0.06, 15.77; p = 0.98). The strength of the evidence was rated as insufficient.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 3: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
One trial comparing lysine clonixinate versus metamizole reported the number of participants with <i>any adverse event</i> and found a	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

significant difference in favor of metamizole (OR 3.50; 95% CI 1.04, 11.81; p = 0.04). Similarly, fewer patients in the metamizole group reported any <i>gastrointestinal disturbance</i> (OR 11.84; 95% CI 1.45, 96.75; p = 0.02). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.			<i>September 2012 assessment: Three experts thought there was no new data.</i>			
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.			Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
ANESTHESIA						
Twenty-one RCTs and one nRCT (n = 1,062) evaluated anesthesia including neuraxial (i.e., continuous vs. single administration) or neuraxial versus general anesthesia, or another form of anesthesia (i.e., spinal or regional); sample sizes ranged from 20 to 90. Additionally, eight cohort studies (n = 3,086)					Up-to-date	Up-to-date

provided additional data. The mean age of participants ranged from 70 to 86 years; most were female. Acute pain was measured using different scales (numeric rating score [1–5] and 10cm VAS). The studies were grouped as follows: spinal versus epidural or general anesthesia (n = 10); neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil (n = 14); neuraxial anesthesia: different doses or modes of administration (continuous vs. single administration) (n = 13).						
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
The average baseline VAS pain score was 4.7. <i>Spinal versus general anesthesia.</i> One RCT (n = 30) reported a statistically significant difference of additional pain relief in favor of spinal anesthesia (MD = -0.86; 95% CI -1.30, -0.42; p = 0.0001). The strength of the evidence was rated as insufficient. <i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil.</i> Three RCTs compared additional fentanyl (n = 40), morphine	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert cited 4 articles with new evidence (none had results isolated in populations of patients with a hip fracture). <i>September 2012 assessment: Three experts thought there was no new data..</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

(n = 40), and sufentanil (n = 50) versus standard spinal anesthesia. In the studies comparing the addition of fentanyl or sufentanil, no patients reported feeling pain following the procedure. In the study comparing the addition of morphine, there was no significant difference between groups (MD = -0.36; 95% CI -1.11, 0.39; p = 0.35). One RCT and one nRCT (n = 80) comparing additional fentanyl reported acute pain on day 1 and found no significant difference between groups (OR 1.24; 95% CI 0.34, 4.48; p = 0.75). The strength of the evidence was rated as insufficient.						
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
<i>Spinal versus general anesthesia or spinal versus epidural anesthesia.</i> Two RCTs reported 30-day mortality (n = 99) and found no statistically significant difference in mortality rates (OR 1.73;	No new data. September 2012 assessment: In one large retrospective cohort study, regional	No new data. September 2012 assessment: No new data.	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert thought there was new evidence and cited 2 distinct	Conclusion is possibly out of date and this portion of the CER may need updating.	Up-to-date	Up-to-date

<p>95% CI 0.53, 5.68; p = 0.36). In two cohort studies (n = 650), pooling was not performed due to marked statistical heterogeneity and conflicting results between the studies. The strength of the evidence was rated as insufficient.</p> <p>In one RCT (n = 30) that reported <i>delirium</i> there was no significant difference between groups (OR 0.76; 95% CI 0.18, 3.24; p = 0.71). The strength of the evidence was rated as insufficient.</p>	<p>anesthesia was associated with a lower adjusted odds ratio of mortality (OR=0.710; p=0.014) and pulmonary complications (OR=0.752; p=<0.0001) relative to general anesthesia.⁶</p> <p>In one retrospective cohort study, in-hospital mortality rates and rates of readmission were not statistically different between the grouper receiving regional anesthesia compared with general anesthesia⁵</p>		<p>studies (but neither had results isolated in populations of patients with a hip fracture).</p> <p><i>September 2012 assessment: Three experts thought there was no new data.</i></p>			
<p><i>Length of stay (LOS) for acute hospitalization</i> was reported in two RCTs (n = 99). LOS was significantly less in the general anesthesia group (MD 1.69; 95% CI 0.38, 3.01; p = 0.01).</p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>Three experts agreed that this conclusion was almost certainly still supported by the evidence.</p> <p><i>September 2012 assessment: Three experts thought there was no new data.</i></p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>
<p><i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil.</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No new</i></p>	<p>Three experts agreed that this conclusion was almost certainly still supported by the</p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>

<p><i>Additional pain medication use</i> was reported in six RCTs. In one RCT (n = 40) comparing the addition of lonidine versus standard spinal anesthesia, all participants required additional pain medication. The pooled estimate from three trials examining the addition of fentanyl (n = 102) showed no significant difference between groups (OR 5.51; 95% CI 0.25, 122.08; p = 0.28). There was no significant difference in additional pain medication use in one RCT (n = 40) that compared the addition of morphine (OR 0.27; 95% CI 0.07, 1.04; p = 0.06). Similarly, three RCTs (n = 132) that compared the addition of sufentanil found no difference between groups (Peto's OR 7.39; 95% CI 0.15, 372.38; p = 0.32).</p>	<i>new data.</i>	<i>data.</i>	evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>			
<p><i>Delirium</i> was reported in one RCT (n = 40) comparing the addition of morphine and found no significant difference between groups (OR 3.15; 95% CI 0.12, 82.16; p = 0.49). The strength of the evidence was rated as insufficient.</p>	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
<p><i>Neuraxial anesthesia: different doses and modes of administration (continuous vs. single administration).</i></p>	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

Three RCTs (n = 163) reported <i>30-day mortality</i> . In two, there were no deaths. In the third, there was no significant difference between groups (OR 0.46; 95% CI 0.07, 3.02; p = 0.42). Additionally, 30-day mortality was reported in one cohort study (n = 291) that found no significant difference between groups (OR 0.96; 95% CI 0.30, 3.00; p = 0.94). The strength of the evidence was rated as low.			<i>September 2012 assessment: Three experts thought there was no new data.</i>			
<i>Additional pain medication use</i> was reported in two RCTs (n = 134); there were no events in either group.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Two experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
<i>LOS for acute hospitalization</i> was reported in two RCTs (n = 89). There was no significant difference between groups (MD = -0.98; 95% CI -2.06, 0.10; p = 0.07). In two RCTs (n = 134) that reported <i>delirium</i> , there was no significant difference between groups (OR 1.27; 95% CI 0.32, 4.99; p = 0.73). The strength of the evidence was rated as low.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
<i>Spinal anesthesia</i>	No new data.	No new data.	Three experts agreed	Conclusion is still valid and this		

<i>(different doses)</i> . One cohort study (n = 182) reported that there was no significant difference in 30-day mortality rates between groups (OR 0.49; 95% CI 0.12, 2.02; p = 0.32). The strength of the evidence was rated as insufficient. Another cohort study (n = 60) reported no significant difference in the incidence of delirium (OR 0.46; 95% CI 0.08, 2.75).	September 2012 assessment: No new data.	September 2012 assessment: No new data.	that this conclusion was almost certainly still supported by the evidence. September 2012 assessment: Two experts thought there was no new data. One expert did not know.	portion of the CER does not need updating.		
In one RCT (n = 60) that reported on <i>additional pain medication use</i> , there was no significant difference between groups at different doses (4 vs. 5mg, 4 vs. 6mg, or 5 vs. 6mg).	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.	Three experts agreed that this conclusion was almost certainly still supported by the evidence. September 2012 assessment: Three experts thought there was no new data.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
<i>Spinal versus general anesthesia or spinal versus epidural anesthesia</i> . Two RCTs (n = 73) and one cohort study (n = 335) reported adverse effects. Overall, the RCTs reported no significant differences in the occurrence of hypotension, myocardial infarction, or ST segment depression. The cohort study found no difference in the incidence of headaches and	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.	Three experts agreed that this conclusion was almost certainly still supported by the evidence. September 2012 assessment: Three experts thought there was no new data.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

hypotension. <i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil.</i> Eleven RCTs and one nRCT (n = 490) provided data on adverse effects. a. <i>Addition of clonidine.</i> One trial (n = 40) reported no damage to surrounding structures, headaches, or infections. b. <i>Addition of fentanyl.</i> There was no significant difference in the number of participants reporting an allergic reaction in four RCTs (n = 164). There was no significant difference in the number of participants reporting bradycardia in one RCT 6 (n = 42). Seven trials (n = 284) reported the frequency of hypotension. Results were inconsistent across studies and the pooled results are not reported due to high heterogeneity. Five trials (n = 204) reported nausea or vomiting and found no significant difference between groups (OR 1.10; 95% CI 0.06, 20.73; p = 0.95). There were no reports of neurological complications in one RCT (n = 40); no reports of respiratory distress in three RCTs (n = 124); no reports of gastrointestinal symptoms in three RCTs	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.	Three experts agreed that this conclusion was almost certainly still supported by the evidence. September 2012 assessment: Three experts thought there was no new data.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
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<p>(n = 140); and no reports of <i>headaches</i> in one trial (n = 40).</p> <p>c. <i>Addition of meperidine.</i> There were no reports of <i>headaches</i> in one RCT (n = 34).</p> <p>d. <i>Addition of morphine.</i> One RCT (n = 40) reported no significant difference in the number of participants reporting <i>allergic reactions, gastrointestinal symptoms, or nausea or vomiting.</i></p> <p>e. <i>Addition of sufentanil.</i> There was no significant difference in the incidence of <i>bradycardia</i> in one trial. Three trials (n = 132) reported a significantly lower incidence of <i>hypotension</i> in participants receiving sufentanil (OR = 0.05; 95% CI 0.01, 0.34). In one RCT (n = 42) there were no reports of <i>allergic reaction, nausea or vomiting, or respiratory distress.</i></p>						
<p><i>Neuraxial anesthesia: different modes of administration.</i> In one cohort study (n = 291), there were no reports of adverse effects. In one RCT (n = 60) there was no significant difference in the occurrence of <i>gastrointestinal symptoms.</i> In two trials (n = 103) that reported on <i>hypotension</i> there was a significant difference between groups in favor of continuous</p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>Three experts agreed that this conclusion was almost certainly still supported by the evidence.</p> <p><i>September 2012 assessment: Three experts thought there was no new data.</i></p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>

<p>spinal anesthesia (OR 0.12; 95% CI 0.03, 0.51; p = 0.004).</p> <p>Similarly, in one cohort study (n = 291) there was a statistically significant difference in favor of continuous spinal anesthesia (OR 0.08; 95% CI 0.04, 0.14; p < 0.00001). There was no significant difference in <i>myocardial infarction</i> in one trial (n = 29). There was no significant difference in the occurrence <i>ST depression</i> in one trial (n = 29). In one RCT (n = 74) there were no reports of <i>bradycardia</i>, <i>myocardial ischemia</i>, or <i>stroke</i>, and no reports of <i>headache</i> in one trial (n = 60) or one cohort study (n = 291).</p>						
<p><i>Neuraxial anesthesia: different doses.</i> In one cohort study (n = 182), there were no reports of adverse effects. In one RCT (n = 60) there was no significant difference in the occurrence of <i>allergic reaction</i> for the different doses of bupivacaine. <i>Bradycardia</i> was reported in two trials (n = 120); there was no significant difference among the different doses of bupivacaine or levobupivacaine. <i>Hypotension</i> was reported in four RCTs (n = 190). There was a There was a</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know.</p> <p>September 2012 assessment: Three experts thought there was no new data.</p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>

<p>significant difference following 4mg versus 6mg of bupivacaine (OR 0.03; 95% CI 0.00, 0.58; $p = 0.02$), but not 5 versus 6mg of bupivacaine (OR 0.31; 95% CI 0.08, 1.13; $p = 0.08$).</p> <p>Three cohort studies reported hypotension ($n = 267$) and found a significant difference following 2.5mg versus 5mg of bupivacaine (OR 0.08; 95% CI 0.03, 0.23; $p < 0.00001$), 4 versus 12mg of bupivacaine (OR 0.03; 95% CI 0.01, 0.15; $p < 0.00001$), and 0.125 versus 0.5 percent of bupivacaine (OR 0.15; 95% CI 0.03, 0.87; $p = 0.03$). One cohort study reported a significant difference in the incidence of hypotension following 4mg versus 12mg (OR 0.03; 95% CI 0.01, 0.15; $p < 0.00001$), but no difference in the incidence of <i>delirium</i>. There were no reports of <i>nausea or vomiting</i> in two trials ($n = 100$); no reports of <i>residual sensory deficits or motor weakness, respiratory distress, sedation, or urinary retention</i> in one RCT ($n = 60$); no reports of <i>gastrointestinal symptoms</i> in two trials ($n = 100$); and no reports of <i>headache</i> in one cohort study ($n = 182$).</p>						
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Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
COMPLIMENTARY AND ALTERNATIVE MEDICINE						
Two RCTs (n = 98) evaluated the administration of CAM interventions versus no or sham intervention. The mean age ranged from 76.8 to 86.3 years; most were female. One trial (n = 38) compared acupressure versus sham control delivered preoperatively. Acute pain was measured using the 10cm VAS; the baseline measure was 6.5cm. The second trial (n = 60) compared the Jacobson relaxation technique (a two-step process of contracting and relaxing specific muscles) versus no intervention. Pain was measured using a 10-point verbal scale; the baseline measure was not reported.					Up-to-date	Up-to-date
Key Question (KQ 1): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with						

usual care or other interventions in all settings?						
Acupressure reduced pain versus a sham intervention (MD -3.01; 95% CI -4.53, -1.49; p <0.0001). Relaxation also showed a reduction in pain versus no relaxation (MD -1.10; 95% CI -1.43, -0.77; p <0.00001). The strength of the evidence was rated as insufficient.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
In the RCT that examined relaxation, fewer patients in the relaxation group required <i>additional pain medication</i> (e.g., meperidine or morphine) versus the control group (MD -8.43; 95% CI -15.11, -1.75; p = 0.01).	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Three experts thought there was no new data.data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data.	No new data.	Two experts agreed	Conclusion is still valid and this	Up-to-date	Up-to-date

	<i>September 2012 assessment: No new data.</i>	<i>September 2012 assessment: No new data.</i>	that this conclusion was almost certainly still supported by the evidence. One expert cited 4 articles (None of which were in a population of people with a hip fracture). <i>September 2012 assessment: Three experts thought there was no new data.</i>	portion of the CER does not need updating.		
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
MULTIMODAL PAIN MANAGEMENT						
Two cohort studies (n = 226) evaluated multimodal pain management versus standard care. These studies described the use of multiple pain management strategies (sequential or in parallel) as part of the clinical pathway for patients with hip fractures. The mean age was not reported; most participants were female. One study compared a formal postoperative protocol of IV and oral tramadol plus					Up-to-date	Up-to-date

acetaminophen versus standard care. The second compared a formal preoperative protocol of skin traction, morphine and acetaminophen versus standard care.						
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert cited 1 article (which was not in a population of people with a hip fracture). <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
<i>Mortality</i> was reported in one study (n = 106). There was no significant difference between groups after 30 days (OR 0.54; 95% CI 0.16, 1.77; p = 0.31), or at 1 year (OR 0.60; 95% CI	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Two</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

0.25, 1.47; p = 0.26). Both studies reported <i>delirium</i> and found no significant difference between groups. The strength of the evidence for both outcomes was rated as insufficient.			<i>experts thought there was no new data. One expert did not know.</i>			
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
Data were reported in one study (n = 106). There were no significant differences between groups.			Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
NERVE BLOCKS						
Twenty-nine RCTs (n = 1,757) evaluated nerve blocks, including 3-in-1 (neurostimulation [NS]/ultrasoundguided [US]), combined lumbar/sacral plexus, fascia iliaca compartment, femoral, lumbar plexus					Up-to-date	Up-to-date

<p>plus sciatic nerve, posterior lumbar plexus, psoas compartment, obutator, and epidural nerve blocks. These were compared with placebo/standard care, or a different method of nerve blocks. Additionally, three cohort studies (n = 696) evaluated 3-in-1, femoral, and lumbar plexus plus sciatic nerve blocks versus analgesia, or comparing different analgesic medications in femoral lumbar plexus plus sciatic blocks. The mean age of participants ranged from 59.2 to 85.9 years; most were female. Acute pain was measured using different scales (i.e., numeric rating scales and 10cm VAS). Eight studies using the VAS reported mean baseline scores from 1.4cm to 7.3cm. The studies were grouped as follows: nerve blocks versus standard care/placebo; nerve blocks versus neuraxial anesthesia; nerve blocks–ropivacaine versus bupivacaine; nerve blocks–addition of clonidine; and nerve blocks</p>						
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
<i>Nerve blocks versus no block.</i> Acute pain was reported in 13 RCTs (n = 942). There was significant	Chang (886) reported an observational study in a letter to	No new data. <i>September 2012 assessment: No new</i>	Two experts agreed that this conclusion was almost certainly still supported by the	Conclusion is possibly out of date and this portion of the CER may need updating.	Up-to-date	Up-to-date

<p>heterogeneity between the study results (I² = 92 percent) and so pooled results are not reported. Even so, subgroup analyses showed significant results in favor of individual nerve blocks, except 3-in-1 block. Also preoperative nerve blocks seemed to be more effective than postoperative administration. One trial (n = 50) reported a significant difference in postoperative pain on day 1 favoring nerve blocks (OR 0.10; 95% CI 0.03, 0.36; p = 0.0005). The strength of the evidence was rated as moderate.</p>	<p>the editor on continuous femoral nerve block infusion (n=4) vs no nerve block (n=12). There was significantly lower incidence of pain on movement or transfer in the nerve block group compared to the no nerve block group on day 4 (p=0.045).</p> <p>September 2012 assessment: No new data.</p>	<p>data.</p>	<p>evidence. One expert cited 4 articles (none of which were in a population with a hip fracture).</p> <p>September 2012 assessment: Three experts thought there was no new data.</p>			
<p><i>Nerve blocks versus neuraxial anesthesia.</i> Acute pain was reported in three RCTs (n = 109). There was no significant difference between groups (MD -0.35; 95% CI -1.10, 0.39; p = 0.35). The strength of the evidence was rated as low.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know.</p> <p>September 2012 assessment: Three experts thought there was no new data.</p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>
<p>Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings?</p> <p>Other outcomes include:</p> <ul style="list-style-type: none"> a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization 						

<p><i>Nerve blocks versus no block.</i></p> <p>Four RCTs (n = 228) evaluated 30-day mortality; there was no significant difference between groups (OR 0.28; 95% CI 0.07, 1.12; p = 0.07). The strength of the evidence was rated as low. There was no significant difference in 1-year mortality in two RCTs (n = 112) (OR 0.82; 95% CI 0.25, 2.72; p = 0.74), or in one cohort study (n = 535) (OR 0.73; 95% CI 0.48, 1.10; p = 0.14). Seven RCTs (n = 378) evaluated <i>additional pain medication use</i> and found a significant difference favoring nerve blocks (OR 0.32; 95% CI 0.14, 0.72; p = 0.006). Similarly, one cohort study (n = 99) reported a significant difference favoring nerve blocks (OR 0.03; 95% CI 0.00, 0.44; p = 0.01). Pooled results for four RCTs (n = 461) and two cohort studies (n = 634) that provided data on <i>delirium</i> showed a significant difference favoring nerve blocks (OR 0.33; 95% CI 0.16, 0.66; p = 0.002 [RCTs]; OR 0.24; 95% CI 0.08, 0.72; p = 0.01[cohort studies]). The strength of the evidence was rated as moderate.</p> <p><i>LOS for acute</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>No new data.</p> <p><i>September 2012 assessment: No new data.</i></p>	<p>Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know.</p> <p><i>September 2012 assessment: Three experts thought there was no new data.</i></p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>		
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<p><i>hospitalization</i> (days) was reported in two cohort studies (n = 634), but the pooled results are not reported due to marked heterogeneity between the original study results.</p> <p><i>Quality of sleep</i> was reported in one RCT (n = 77) that found no significant difference (MD 0.30; 95% CI -0.46, 1.06; p = 0.44).</p>						
<p><i>Nerve blocks versus neuraxial anesthesia.</i> Additional pain medication use was reported in one RCT (n=30); there was no significant difference between groups (OR 2.00; 95% CI 0.38, 10.51; p = 0.41). Delirium was reported in one RCT (n = 29); there was no significant difference between groups (OR 1.20; 95% CI 0.27, 5.40; p = 0.81). The strength of the evidence was rated as insufficient.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know.</p> <p>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>
<p><i>Ropivacaine versus bupivacaine.</i> Additional pain medication use and delirium were reported in one cohort study (n=62). There was no significant difference between groups for either outcome (OR 1.25; 95% CI 0.42, 3.76; p=0.69; OR 1.93; 95% CI 0.17, 22.50; p=0.60, respectively). The strength of the evidence for delirium was rated as insufficient.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>No new data.</p> <p>September 2012 assessment: No new data.</p>	<p>Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know.</p> <p>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</p>	<p>Conclusion is still valid and this portion of the CER does not need updating.</p>	<p>Up-to-date</p>	<p>Up-to-date</p>

Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
<p><i>Nerve blocks versus no block.</i></p> <p><i>Respiratory infection</i> was reported in five RCTs (n=268) and found no significant difference (OR 0.43; 95% CI 0.18, 1.04; p=0.06). There were no significant differences between groups for the following adverse effects: <i>cardiac complications</i> (2 RCTs, n=128; 1 cohort study, n=99); <i>damage to surrounding structures</i> (3 RCTs, n=224); <i>deep venous thrombosis</i> (2 RCTs, n=100); <i>myocardial infarction</i> (2 RCTs, n=145; 1 cohort study, n=535); <i>nausea/vomiting</i> (6 RCTs, n = 421); <i>pulmonary embolism</i> (2 RCTs, n = 128); <i>surgical wound infection</i> (2 RCTs, n = 110); <i>urinary retention</i> (2 RCTs, n = 62; 1 cohort study, n = 535). There were no reports of infection in two RCTs (n = 184). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.</p>	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.				
<p><i>Nerve blocks versus neuraxial anesthesia, ropivacaine versus</i></p>	No new data. September 2012	No new data. September 2012	Two experts agreed that this conclusion was almost certainly	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

<i>bupivacaine and addition of clonidine.</i> The reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.	assessment: No new data.	assessment: No new data.	still supported by the evidence. One expert did not know. September 2012 assessment: Two experts thought there was no new data. One expert did not know.			
<i>US versus NS.</i> Two RCTs (n = 100) reported no significant difference in damage to surrounding structures (OR 0.16; 95% CI 0.02, 1.30; p = 0.09). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. September 2012 assessment: Two experts thought there was no new data. One expert did not know.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
One RCT recruited patients with pre-existing heart disease. There was a significant reduction in pain favoring nerve blocks (MD -0.55; -0.81, -0.29; p <0.0001). There was no significant difference in 30-day mortality (OR 0.10; 95% CI 0.01, 1.90; p = 0.12) or adverse effects. One RCT recruited participants that were independent prior to their hip fracture. There was no significant difference	No new data. September 2012 assessment: No new data.	No new data. September 2012 assessment: No new data.	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. September 2012 assessment: Two experts thought there was no new data. One expert did not know.	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

between nerve blocks versus standard care for 30-day mortality (OR 1.00; 95% CI 0.06, 16.76; p = 1.00).						
NEUROSTIMULATION						
Two RCTs (n = 123) evaluated transcutaneous electrical neurostimulation (TENS) versus sham control. One trial administered the TENS preoperatively, and the other postoperatively. The mean age of participants ranged from 71.2 to 80.5 years; most were female. Pain was measured using the VAS; the mean baseline measure was 8.4 to 8.8.					Up-to-date	Up-to-date
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
Two RCTs (n = 123) found a significant difference in additional pain relief in favor of TENS (MD -2.79; 95% CI -4.95, -0.64; p = 0.01). Pain on movement was reported in one trial (n = 60) and found a significant difference in favor of TENS (MD -3.90; 95% CI -6.22, -1.58; p = 0.001). The strength of the evidence was rated as insufficient.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status						

c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
One RCT (n = 60) provided data on <i>health-related quality of life (HRQOL)</i> and <i>quality of sleep</i> . TENS provided significant improvement in HRQOL (MD -4.30; 95% CI -6.86, -1.74; p = 0.001) and quality of sleep (MD -3.60; 95% CI -5.75, -1.45; p = 0.001).	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert cited 1 article (which was not in a population with a hip fracture). <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert cited 1 article (which was not in a population with a hip fracture). <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data.	No new data.	Three experts agreed	Conclusion is still valid and this	Up-to-date	Up-to-date

	<i>September 2012 assessment: No new data.</i>	<i>September 2012 assessment: No new data.</i>	that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	portion of the CER does not need updating.		
REHABILITATION						
One RCT (n = 37) evaluated physical therapy (stretching and strengthening of spinal and psoas muscles) versus standard care. The mean age was 67.1; all participants were female. Pain was measured using the 10cm VAS; the mean baseline measure was 7.9cm.					Up-to-date	Up-to-date
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
There was a significant difference in additional pain relief following physical therapy (MD - 1.39; 95% CI -2.27, -0.51; p = 0.002). The strength of the evidence was rated as insufficient.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity						

d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
No other outcomes were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert cited 2 articles (neither of which were in a population with a hip fracture). <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three experts thought there was no new data.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
All participants were female.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Three experts agreed that this conclusion was almost certainly still supported by the evidence. <i>September 2012 assessment: Three</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

			<i>experts thought there was no new data.</i>			
TRACTION						
Nine RCTs, four nRCTs, and one cohort study evaluated skin or skeletal traction versus no intervention or other interventions. Sample sizes ranged from 60 to 311. The mean age ranged from 74.0 to 81.0; most participants were female.					Up-to-date	Up-to-date
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?						
Acute pain was measured using the 10cm VAS; the mean baseline measure ranged from 0.3 to 6.9cm. Eight trials compared skin traction (n = 498) versus no traction (n = 594) and found no significant difference between groups. The strength of the evidence was rated as low. One trial (n = 78) compared skin traction versus skeletal traction and found no difference between groups. The strength of the evidence was rated as insufficient.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life						

f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization						
<i>LOS for acute hospitalization</i> was reported in two trials (n = 326) comparing skin traction versus no traction and no significant difference was found. <i>Thirty-day mortality</i> was reported in one RCT (n = 80) that found no difference between skin and skeletal traction versus no traction. <i>Additional pain medication use</i> was reported in one RCT and one nRCT (n = 352). There was no significant difference between groups.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?						
Seven RCTs (n = 1,043) and one cohort study (n = 134) provided data on adverse effects. The reported adverse effects were from one to two studies, and did not demonstrate any significant statistical differences between the pain management interventions.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

			<i>know.</i>			
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?						
No data were reported.	No new data. <i>September 2012 assessment: No new data.</i>	No new data. <i>September 2012 assessment: No new data.</i>	Two experts agreed that this conclusion was almost certainly still supported by the evidence. One expert did not know. <i>September 2012 assessment: Two experts thought there was no new data. One expert did not know.</i>	Conclusion is still valid and this portion of the CER does not need updating.	Up-to-date	Up-to-date

Legend: RCT = randomized control trial; nRCT = non-randomized control trial; LOS = length of stay; VAS = visual analog scale; MD = mean difference; CI = confidence intervals; OR = odds ratio

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3. Shojania KG, Sampson M, Ansari MT, et al. How quickly do systematic reviews go out of date? A survival analysis. *Ann Intern Med.* 2007 Aug 21;147(4):224-33. PMID 17638714.
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Appendices

Appendix A: Search Methodology

Appendix B: Evidence Table

Appendix C: Questionnaire Matrix

Appendix A. Search Methodology

DATABASE SEARCHED & TIME PERIOD COVERED:

Medline on OVID – 2011-9/13/2012

LIMITERS:

English
Human

SEARCH STRATEGY:

exp "anesthesia and analgesia"/ or exp analgesia/ OR ((an?esthet\$ or an?esthesia) adj4 (regional\$ or local\$ or general or spinal or epidural)).mp. OR (block or analges*).mp.

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR ("neck of femur" adj4 fractur*).mp.

OR

((pain* or discomfort* or ache* or aching or sore* or suffer*) adj3 (assess* or relief or relieve* or reduc* or treat* or manage* or control* or experience* or medicat* or duration or evaluat* or alleviat* or level or score* or subjective or felt or prevent* or duration or outcome* or heal or healing or therap* or recover* or "quality of life")).mp. OR exp Pain/rt, th, us, rh, dh, su, pc, dt OR pain postoperative/pc, th OR Pain Measurement/

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR ("neck of femur" adj4 fractur*).mp.

OR

exp Pain/

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR ("neck of femur" adj4 fractur*).mp.

OR

exp Therapeutics/ or exp "Outcome Assessment (Health Care)"/ or exp "Length of Stay"/ or "Quality of Life"/ or "functional outcome".ti,ab.

AND

exp Hip Fractures/rh, nu, th, dt, dh

AND

LIMITING TO THE FOLLOWING JOURNALS:

Annals of Internal Medicine
BMJ

JAMA
Lancet
New England Journal of Medicine

Anesthesia & Analgesia
Anesthesiology
Emergency Medicine
Journal of the American Geriatrics Society
Osteoporosis International
Regional Anesthesia & Pain Medicine

TOTAL NUMBER OF RESULTS: 165

NUMBER OF RESULTS WHEN LIMITED TO SPECIFIED JOURNALS: 22

DATABASE SEARCHED & TIME PERIOD COVERED:

Medline on OVID – 2008-11/10/2011

LIMITERS:

English
Human

SEARCH STRATEGY:

exp "anesthesia and analgesia"/ or exp analgesia/ OR ((an?esthet\$ or an?esthesia) adj4 (regional\$ or local\$ or general or spinal or epidural)).mp. OR (block or analges*).mp.

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR ("neck of femur" adj4 fractur*).mp.

OR

((pain* or discomfort* or ache* or aching or sore* or suffer*) adj3 (assess* or relief or relieve* or reduc* or treat* or manage* or control* or experience* or medicat* or duration or evaluat* or alleviat* or level or score* or subjective or felt or prevent* or duration or outcome* or heal or healing or therap* or recover* or "quality of life")).mp. OR exp Pain/rt, th, us, rh, dh, su, pc, dt OR pain postoperative/pc, th OR Pain Measurement/

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR ("neck of femur" adj4 fractur*).mp.

OR

exp Pain/

AND

exp Hip Fractures/ OR ((intertrochanter* or petrochanter* or subtrochanter* or extracapsular or petrochant* or trochant* or hip or femoral neck) adj4 (hemiarthroplasty or fracture*)).mp. OR

("neck of femur" adj4 fractur*).mp.

OR

exp Therapeutics/ or exp "Outcome Assessment (Health Care)"/ or exp "Length of Stay"/ or
"Quality of Life"/ or "functional outcome".ti,ab.

AND

exp Hip Fractures/rh, nu, th, dt, dh

AND

LIMITING TO THE FOLLOWING JOURNALS:

Annals of Internal Medicine

BMJ

JAMA

Lancet

New England Journal of Medicine

Anesthesia & Analgesia

Anesthesiology

Emergency Medicine

Journal of the American Geriatrics Society

Osteoporosis International

Regional Anesthesia & Pain Medicine

TOTAL NUMBER OF RESULTS: 481 WITH REMOVAL OF DUPLICATES

NUMBER OF RESULTS WHEN LIMITED TO SPECIFIED JOURNALS: 30

Appendix B. Evidence Table

Author, year	Trial	n	Subjects	Primary Outcome	Duration	Study Quality	Findings
Key Question (KQ) 1: In older adults (≥ 50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?							
<i>SYSTEMIC ANALGESIA</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>ANESTHESIA</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>COMPLIMENTARY AND ALTERNATIVE MEDICINE</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>MULTIMODAL PAIN MANAGEMENT</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>NERVE BLOCKS</i>							
Chang, 2011 ⁴	Observational study comparing the use of a femoral nerve block with no nerve block (and standard care)	n = 16 -Femoral nerve block: 4 -No nerve block: 12	Femoral nerve block: -Avg age: 71.3 (13) -Female: 4/4 No nerve block: -Avg age: 80.2 (6.6) -Female: 6/12	Acute pain	4 days	Poor	Lower incidence of pain on movement or transfer in the femoral nerve block group compared with the nonfemoral nerve block group on postblock day 4 (p=0.045)
<i>NEUROSTIMULATION</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>REHABILITATION</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>TRACTION</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
Key Question (KQ) 2: In older adults (≥ 50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include:							
a. Mortality (30-day and up to 1 year postfracture)							
b. Functional status							
c. Pain medication use; change in type and quantity							
d. Mental status							

Author, year	Trial	n	Subjects	Primary Outcome	Duration	Study Quality	Findings
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
NEUROSTIMULATION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
REHABILITATION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
TRACTION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?							
SYSTEMIC ANALGESIA							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
ANESTHESIA							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
COMPLIMENTARY AND ALTERNATIVE MEDICINE							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
MULTIMODAL PAIN MANAGEMENT							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
NERVE BLOCKS							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
NEUROSTIMULATION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
REHABILITATION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
TRACTION							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?							
SYSTEMIC ANALGESIA							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
ANESTHESIA							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
COMPLIMENTARY AND ALTERNATIVE MEDICINE							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
MULTIMODAL PAIN MANAGEMENT							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
NERVE BLOCKS							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
NEUROSTIMULATION							

Author, year	Trial	n	Subjects	Primary Outcome	Duration	Study Quality	Findings
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>REHABILITATION</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.
<i>TRACTION</i>							
No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.	No new data.

Avg = average; OR = odds ratio

Appendix C. Questionnaire Matrix

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<u>Systemic Analgesia</u>			
Three RCTs (n = 214) evaluated different types of systemic analgesia. The mean age ranged from 77.2 to 78.5 years; most patients were female.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
All three trials reported acute pain. Acute pain was measured using the 10cm Visual Analogue Scale (VAS); the mean baseline measure was 6.5cm. One trial (n = 90) comparing parecoxib intravenous (IV) versus diclofenac intramuscular (IM) ± meperidine IM found a significant difference in favor of parecoxib IV (MD -0.70; 95% confidence interval [CI] -1.04, -0.36; p <0.0001). The second trial (n = 30) comparing intrathecal isotonic clonidine versus intrathecal hypertonic clonidine reported a significant difference in favor of isotonic clonidine (MD -1.69; 95% CI -2.01, -1.37; p <0.00001). The third trial (n = 94) comparing lysine clonixinate versus metamizole found no significant difference (MD -0.43; 95% CI -1.30, 0.44; p = 0.33). The strength of the evidence was rated as	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
insufficient.			
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: <ul style="list-style-type: none"> a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization 			
<i>Additional pain medication use</i> was reported in one trial comparing lysine clonixinate versus metamizole and reported no significant difference between groups (OR 3.00; 95% CI 0.30, 29.94; p = 0.35). <i>Delirium</i> was reported in one trial comparing lysine clonixinate versus metamizole and found no significant difference (OR 0.96; 95% CI 0.06, 15.77; p = 0.98). The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 3: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
One trial comparing lysine clonixinate versus metamizole reported the number of participants with <i>any adverse event</i> and found a significant difference in favor of	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
metamizole (OR 3.50; 95% CI 1.04, 11.81; p = 0.04). Similarly, fewer patients in the metamizole group reported any <i>gastrointestinal disturbance</i> (OR 11.84; 95% CI 1.45, 96.75; p = 0.02). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.			
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<u>Anesthesia</u>			
Twenty-one RCTs and one nRCT (n = 1,062) evaluated anesthesia including neuraxial (i.e., continuous vs. single administration) or neuraxial versus general anesthesia, or another form of anesthesia (i.e., spinal or regional); sample sizes ranged from 20 to 90. Additionally, eight cohort studies (n = 3,086) provided additional data. The mean age of participants ranged		New Evidence:	

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p>from 70 to 86 years; most were female. Acute pain was measured using different scales (numeric rating score [1–5] and 10cm VAS). The studies were grouped as follows: spinal versus epidural or general anesthesia (n = 10); neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil (n = 14); neuraxial anesthesia: different doses or modes of administration (continuous vs. single administration) (n = 13).</p>	<input data-bbox="863 391 919 444" type="checkbox"/>		<input data-bbox="1812 391 1869 444" type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
<p>The average baseline VAS pain score was 4.7.</p> <p><i>Spinal versus general anesthesia.</i> One RCT (n = 30) reported a statistically significant difference of additional pain relief in favor of spinal anesthesia (MD = -0.86; 95% CI -1.30, -0.42; p = 0.0001). The strength of the evidence was rated as insufficient.</p> <p><i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil.</i> Three RCTs compared additional fentanyl (n = 40), morphine (n = 40), and sufentanil (n = 50) versus standard spinal anesthesia. In the studies comparing the addition of fentanyl or sufentanil, no patients reported feeling pain following the procedure. In the study comparing the addition of morphine, there was no significant difference between groups (MD = -0.36; 95% CI -1.11, 0.39; p</p>	<input data-bbox="863 1003 919 1057" type="checkbox"/>	<p>New Evidence:</p>	<input data-bbox="1812 1003 1869 1057" type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
= 0.35). One RCT and one nRCT (n = 80) comparing additional fentanyl reported acute pain on day 1 and found no significant difference between groups (OR 1.24; 95% CI 0.34, 4.48; p = 0.75). The strength of the evidence was rated as insufficient.			
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
<i>Spinal versus general anesthesia or spinal versus epidural anesthesia.</i> Two RCTs reported 30-day mortality (n = 99) and found no statistically significant difference in mortality rates (OR 1.73; 95% CI 0.53, 5.68; p = 0.36). In two cohort studies (n = 650), pooling was not performed due to marked statistical heterogeneity and conflicting results between the studies. The strength of the evidence was rated as insufficient. In one RCT (n = 30) that reported <i>delirium</i> there was no significant difference between groups (OR 0.76; 95% CI 0.18, 3.24; p = 0.71). The strength of the evidence was	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
rated as insufficient.			
<i>Length of stay (LOS) for acute hospitalization</i> was reported in two RCTs (n = 99). LOS was significantly less in the general anesthesia group (MD 1.69; 95% CI 0.38, 3.01; p = 0.01).	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil. Additional pain medication use</i> was reported in six RCTs. In one RCT (n = 40) comparing the addition of lonidine versus standard spinal anesthesia, all participants required additional pain medication. The pooled estimate from three trials examining the addition of fentanyl (n = 102) showed no significant difference between groups (OR 5.51; 95% CI 0.25, 122.08; p = 0.28). There was no significant difference in additional pain medication use in one RCT (n = 40) that compared the addition of morphine (OR 0.27; 95% CI 0.07, 1.04; p = 0.06). Similarly, three RCTs (n = 132) that compared the addition of sufentanil found no difference between groups (Peto's OR 7.39; 95% CI 0.15, 372.38; p = 0.32).	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<i>Delirium</i> was reported in one RCT (n = 40) comparing the addition of morphine and found no significant difference between groups (OR 3.15; 95% CI 0.12, 82.16; p = 0.49). The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p><i>Neuraxial anesthesia: different doses and modes of administration (continuous vs. single administration).</i></p> <p>Three RCTs (n = 163) reported 30-day mortality. In two, there were no deaths. In the third, there was no significant difference between groups (OR 0.46; 95% CI 0.07, 3.02; p = 0.42). Additionally, 30-day mortality was reported in one cohort study (n = 291) that found no significant difference between groups (OR 0.96; 95% CI 0.30, 3.00; p = 0.94). The strength of the evidence was rated as low.</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<p><i>Additional pain medication use</i> was reported in two RCTs (n = 134); there were no events in either group.</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<p><i>LOS for acute hospitalization</i> was reported in two RCTs (n = 89). There was no significant difference between groups (MD = -0.98; 95% CI -2.06, 0.10; p = 0.07). In two RCTs (n = 134) that reported <i>delirium</i>, there was no significant difference between groups (OR 1.27; 95% CI 0.32, 4.99; p = 0.73). The strength of the evidence was rated as low.</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<p><i>Spinal anesthesia (different doses).</i> One cohort study (n = 182) reported that there was no significant difference in 30-day mortality rates between groups (OR 0.49; 95% CI 0.12, 2.02; p = 0.32). The strength of the evidence was rated as insufficient. Another cohort study (n = 60) reported no significant difference in the incidence of delirium (OR 0.46; 95% CI 0.08, 2.75).</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
In one RCT (n = 60) that reported on <i>additional pain medication use</i> , there was no significant difference between groups at different doses (4 vs. 5mg, 4 vs. 6mg, or 5 vs. 6mg).	<input data-bbox="863 435 919 492" type="checkbox"/>	New Evidence:	<input data-bbox="1812 435 1869 492" type="checkbox"/>
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
<i>Spinal versus general anesthesia or spinal versus epidural anesthesia.</i> Two RCTs (n = 73) and one cohort study (n = 335) reported adverse effects. Overall, the RCTs reported no significant differences in the occurrence of hypotension, myocardial infarction, or ST segment depression. The cohort study found no difference in the incidence of headaches and hypotension.	<input data-bbox="863 743 919 800" type="checkbox"/>	New Evidence:	<input data-bbox="1812 743 1869 800" type="checkbox"/>
<i>Neuraxial anesthesia: addition of clonidine, fentanyl, meperidine, morphine, or sufentanil.</i> Eleven RCTs and one nRCT (n = 490) provided data on adverse effects. a. <i>Addition of clonidine.</i> One trial (n = 40) reported no damage to surrounding structures, headaches, or infections. b. <i>Addition of fentanyl.</i> There was no significant difference in the number of participants reporting an <i>allergic reaction</i> in four RCTs (n = 164). There was no significant difference in the number of participants reporting <i>bradycardia</i> in one RCT 6 (n = 42). Seven trials (n = 284) reported the frequency of <i>hypotension</i> . Results were inconsistent across studies and the pooled results are not reported due to	<input data-bbox="863 1141 919 1198" type="checkbox"/>	New Evidence:	<input data-bbox="1812 1141 1869 1198" type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p>high heterogeneity. Five trials (n = 204) reported <i>nausea or vomiting</i> and found no significant difference between groups (OR 1.10; 95% CI 0.06, 20.73; p = 0.95). There were no reports of <i>neurological complications</i> in one RCT (n = 40); no reports of <i>respiratory distress</i> in three RCTs (n = 124); no reports of <i>gastrointestinal symptoms</i> in three RCTs (n = 140); and no reports of <i>headaches</i> in one trial (n = 40).</p> <p>c. <i>Addition of meperidine</i>. There were no reports of <i>headaches</i> in one RCT (n = 34).</p> <p>d. <i>Addition of morphine</i>. One RCT (n = 40) reported no significant difference in the number of participants reporting <i>allergic reactions, gastrointestinal symptoms</i>, or <i>nausea or vomiting</i>.</p> <p>e. <i>Addition of sufentanil</i>. There was no significant difference in the incidence of <i>bradycardia</i> in one trial. Three trials (n = 132) reported a significantly lower incidence of <i>hypotension</i> in participants receiving sufentanil (OR = 0.05; 95% CI 0.01, 0.34). In one RCT (n = 42) there were no reports of <i>allergic reaction, nausea or vomiting</i>, or <i>respiratory distress</i>.</p>			
<p><i>Neuraxial anesthesia: different modes of administration</i>.</p> <p>In one cohort study (n = 291), there were no reports of adverse effects. In one RCT (n = 60) there was no significant difference in the occurrence of <i>gastrointestinal symptoms</i>. In two trials (n = 103) that</p>	<div data-bbox="863 1291 919 1347" data-label="Image"></div>	New Evidence:	<div data-bbox="1812 1291 1869 1347" data-label="Image"></div>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p>reported on <i>hypotension</i> there was a significant difference between groups in favor of continuous spinal anesthesia (OR 0.12; 95% CI 0.03, 0.51; $p = 0.004$). Similarly, in one cohort study ($n = 291$) there was a statistically significant difference in favor of continuous spinal anesthesia (OR 0.08; 95% CI 0.04, 0.14; $p < 0.00001$). There was no significant difference in <i>myocardial infarction</i> in one trial ($n = 29$). There was no significant difference in the occurrence <i>ST depression</i> in one trial ($n = 29$). In one RCT ($n = 74$) there were no reports of <i>bradycardia</i>, <i>myocardial ischemia</i>, or <i>stroke</i>, and no reports of <i>headache</i> in one trial ($n = 60$) or one cohort study ($n = 291$).</p>			
<p><i>Neuraxial anesthesia: different doses.</i> In one cohort study ($n = 182$), there were no reports of adverse effects. In one RCT ($n = 60$) there was no significant difference in the occurrence of <i>allergic reaction</i> for the different doses of bupivacaine. <i>Bradycardia</i> was reported in two trials ($n = 120$); there was no significant difference among the different doses of bupivacaine or levobupivacaine. <i>Hypotension</i> was reported in four RCTs ($n = 190$). There was a significant difference following 4mg versus 6mg of bupivacaine (OR 0.03; 95% CI 0.00, 0.58; $p = 0.02$), but not 5 versus 6mg of bupivacaine (OR 0.31; 95% CI 0.08, 1.13; $p = 0.08$). Three cohort studies reported hypotension</p>	<div data-bbox="863 1138 919 1195" data-label="Image"></div>	<p>New Evidence:</p>	<div data-bbox="1812 1138 1869 1195" data-label="Image"></div>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p>(n = 267) and found a significant difference following 2.5mg versus 5mg of bupivacaine (OR 0.08; 95% CI 0.03, 0.23; p <0.00001), 4 versus 12mg of bupivacaine (OR 0.03; 95% CI 0.01, 0.15; p <0.00001), and 0.125 versus 0.5 percent of bupivacaine (OR 0.15; 95% CI 0.03, 0.87; p = 0.03). One cohort study reported a significant difference in the incidence of hypotension following 4mg versus 12mg (OR 0.03; 95% CI 0.01, 0.15; p <0.00001), but no difference in the incidence of <i>delirium</i>. There were no reports of <i>nausea or vomiting</i> in two trials (n = 100); no reports of <i>residual sensory deficits or motor weakness, respiratory distress, sedation, or urinary retention</i> in one RCT (n = 60); no reports of <i>gastrointestinal symptoms</i> in two trials (n = 100); and no reports of <i>headache</i> in one cohort study (n = 182).</p>			
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<u>Complementary and Alternative Medicine</u>			
Two RCTs (n = 98) evaluated the administration of CAM interventions versus no or sham intervention. The mean age ranged from 76.8 to 86.3 years; most were female. One trial (n = 38) compared acupressure versus sham control delivered	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
preoperatively. Acute pain was measured using the 10cm VAS; the baseline measure was 6.5cm. The second trial (n = 60) compared the Jacobson relaxation technique (a two-step process of contracting and relaxing specific muscles) versus no intervention. Pain was measured using a 10-point verbal scale; the baseline measure was not reported.			
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
Acupressure reduced pain versus a sham intervention (MD -3.01; 95% CI -4.53, -1.49; p <0.0001). Relaxation also showed a reduction in pain versus no relaxation (MD -1.10; 95% CI -1.43, -0.77; p <0.00001). The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
In the RCT that examined relaxation, fewer patients in the relaxation group required	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<i>additional pain medication</i> (e.g., meperidine or morphine) versus the control group (MD -8.43; 95% CI -15.11, -1.75; p = 0.01).			
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<u>Multimodal Pain Management</u>			
Two cohort studies (n = 226) evaluated multimodal pain management versus standard care. These studies described the use of multiple pain management strategies (sequential or in parallel) as part of the clinical pathway for patients with hip fractures. The mean age was not reported; most participants were female. One study compared a formal postoperative protocol of IV and oral tramadol plus acetaminophen versus standard care. The second compared a formal preoperative protocol of skin traction, morphine and acetaminophen versus standard care.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with			

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
<i>Mortality</i> was reported in one study (n = 106). There was no significant difference between groups after 30 days (OR 0.54; 95% CI 0.16, 1.77; p = 0.31), or at 1 year (OR 0.60; 95% CI 0.25, 1.47; p = 0.26). Both studies reported <i>delirium</i> and found no significant difference between groups. The strength of the evidence for both outcomes was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 3: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
Data were reported in one study (n = 106). There were no significant differences between groups.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<u>Nerve Blocks</u>			
<p>Twenty-nine RCTs (n = 1,757) evaluated nerve blocks, including 3-in-1 (neurostimulation [NS]/ultrasoundguided [US]), combined lumbar/sacral plexus, fascia iliaca compartment, femoral, lumbar plexus plus sciatic nerve, posterior lumbar plexus, psoas compartment, obutator, and epidural nerve blocks. These were compared with placebo/standard care, or a different method of nerve blocks.</p> <p>Additionally, three cohort studies (n = 696) evaluated 3-in-1, femoral, and lumbar plexus plus sciatic nerve blocks versus analgesia, or comparing different analgesic medications in femoral lumbar plexus plus sciatic blocks. The mean age of participants ranged from 59.2 to 85.9 years; most were female. Acute pain was measured using different scales (i.e., numeric rating scales and 10cm VAS). Eight studies using the VAS reported mean baseline scores from 1.4cm to 7.3cm. The studies were grouped as follows: nerve blocks versus standard care/placebo; nerve blocks versus neuraxial anesthesia; nerve blocks–ropivacaine versus bupivacaine; nerve blocks–addition of</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
clonidine; and nerve blocks–ultrasound versus neurostimulation.			
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
Research on very young children is preliminary, with four studies identified. One good-quality RCT suggested benefit from the use of ESDM in young children, with improvements in adaptive behavior, language, and cognitive outcomes. Diagnostic shifts within the autism spectrum were reported in close to 30 percent of children but were not associated with clinically significant improvements in ADOS severity scores or other measures.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
<i>Nerve blocks versus no block.</i> Four RCTs (n = 228) evaluated 30-day mortality; there was no significant difference between groups (OR 0.28; 95% CI 0.07, 1.12; p = 0.07). The strength of the	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<p>evidence was rated as low. There was no significant difference in 1-year mortality in two RCTs (n = 112) (OR 0.82; 95% CI 0.25, 2.72; p = 0.74), or in one cohort study (n = 535) (OR 0.73; 95% CI 0.48, 1.10; p = 0.14). Seven RCTs (n = 378) evaluated <i>additional pain medication use</i> and found a significant difference favoring nerve blocks (OR 0.32; 95% CI 0.14, 0.72; p = 0.006). Similarly, one cohort study (n = 99) reported a significant difference favoring nerve blocks (OR 0.03; 95% CI 0.00, 0.44; p = 0.01). Pooled results for four RCTs (n = 461) and two cohort studies (n = 634) that provided data on <i>delirium</i> showed a significant difference favoring nerve blocks (OR 0.33; 95% CI 0.16, 0.66; p = 0.002 [RCTs]; OR 0.24; 95% CI 0.08, 0.72; p = 0.01[cohort studies]). The strength of the evidence was rated as moderate. <i>LOS for acute hospitalization</i> (days) was reported in two cohort studies (n = 634), but the pooled results are not reported due to marked heterogeneity between the original study results. <i>Quality of sleep</i> was reported in one RCT (n = 77) that found no significant difference (MD 0.30; 95% CI -0.46, 1.06; p = 0.44).</p>			
<p><i>Nerve blocks versus neuraxial anesthesia.</i> Additional pain medication use was reported in one RCT (n=30); there was no significant difference between groups (OR 2.00; 95% CI 0.38, 10.51; p = 0.41). Delirium was reported in one RCT (n = 29);</p>	<div data-bbox="863 1305 919 1364" data-label="Image"></div>	<p>New Evidence:</p>	<div data-bbox="1812 1305 1869 1364" data-label="Image"></div>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
there was no significant difference between groups (OR 1.20; 95% CI 0.27, 5.40; p = 0.81). The strength of the evidence was rated as insufficient.			
<i>Ropivacaine versus bupivacaine. Additional pain medication use and delirium</i> were reported in one cohort study (n=62). There was no significant difference between groups for either outcome (OR 1.25; 95% CI 0.42, 3.76; p=0.69; OR 1.93; 95% CI 0.17, 22.50; p=0.60, respectively). The strength of the evidence for delirium was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
<i>Nerve blocks versus no block. Respiratory infection</i> was reported in five RCTs (n=268) and found no significant difference (OR 0.43; 95% CI 0.18, 1.04; p=0.06). There were no significant differences between groups for the following adverse effects: <i>cardiac complications</i> (2 RCTs, n=128; 1 cohort study, n=99); <i>damage to surrounding structures</i> (3 RCTs, n=224); <i>deep venous thrombosis</i> (2 RCTs, n=100); <i>myocardial infarction</i> (2 RCTs, n=145; 1 cohort study, n=535); <i>nausea/vomiting</i> (6 RCTs, n = 421); <i>pulmonary embolism</i> (2 RCTs, n = 128); <i>surgical wound infection</i> (2 RCTs, n = 110); <i>urinary retention</i> (2 RCTs, n = 62; 1 cohort study, n = 535). There were no reports of infection in two	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
RCTs (n = 184). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.			
<i>Nerve blocks versus neuraxial anesthesia, ropivacaine versus bupivacaine and addition of clonidine.</i> The reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<i>US versus NS.</i> Two RCTs (n = 100) reported no significant difference in damage to surrounding structures (OR 0.16; 95% CI 0.02, 1.30; p = 0.09). The remaining reported adverse effects were from single studies and did not demonstrate any significant statistical differences between the pain management interventions.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
One RCT recruited patients with pre-existing heart disease. There was a significant reduction in pain favoring nerve blocks (MD -0.55; -0.81, -0.29; p <0.0001). There was no significant difference in 30-day mortality (OR 0.10; 95% CI 0.01, 1.90; p = 0.12) or adverse effects. One RCT recruited participants that were independent prior to their hip fracture. There was no significant difference between nerve blocks	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
versus standard care for 30-day mortality (OR 1.00; 95% CI 0.06, 16.76; p = 1.00).			
<u>Neurostimulation</u>			
Two RCTs (n = 123) evaluated transcutaneous electrical neurostimulation (TENS) versus sham control. One trial administered the TENS preoperatively, and the other postoperatively. The mean age of participants ranged from 71.2 to 80.5 years; most were female. Pain was measured using the VAS; the mean baseline measure was 8.4 to 8.8.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
Two RCTs (n = 123) found a significant difference in additional pain relief in favor of TENS (MD -2.79; 95% CI -4.95, -0.64; p = 0.01). Pain on movement was reported in one trial (n = 60) and found a significant difference in favor of TENS (MD -3.90; 95% CI -6.22, -1.58; p = 0.001). The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life			

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
One RCT (n = 60) provided data on <i>health-related quality of life (HRQOL)</i> and <i>quality of sleep</i> . TENS provided significant improvement in HRQOL (MD -4.30; 95% CI -6.86, -1.74; p = 0.001) and quality of sleep (MD -3.60; 95% CI -5.75, -1.45; p = 0.001).	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
<u>Rehabilitation</u>			
One RCT (n = 37) evaluated physical therapy (stretching and strengthening of spinal and psoas muscles) versus standard care. The mean age was 67.1; all participants were female. Pain was measured using the 10cm VAS; the mean baseline measure was 7.9cm.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with			

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
usual care or other interventions in all settings?			
There was a significant difference in additional pain relief following physical therapy (MD -1.39; 95% CI -2.27, -0.51; p = 0.002). The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements i. Health services utilization			
No other outcomes were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
All participants were female.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
<u>Traction</u>			
Nine RCTs, four nRCTs, and one cohort study evaluated skin or skeletal traction versus no intervention or other interventions. Sample sizes ranged from 60 to 311. The mean age ranged from 74.0 to 81.0; most participants were female.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 1: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions for controlling acute (up to 30 days postfracture) and chronic pain (up to 1 year postfracture) compared with usual care or other interventions in all settings?			
Acute pain was measured using the 10cm VAS; the mean baseline measure ranged from 0.3 to 6.9cm. Eight trials compared skin traction (n = 498) versus no traction (n = 594) and found no significant difference between groups. The strength of the evidence was rated as low. One trial (n = 78) compared skin traction versus skeletal traction and found no difference between groups. The strength of the evidence was rated as insufficient.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ) 2: In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the effectiveness of pharmacologic and/or nonpharmacologic pain management interventions on other outcomes up to 1 year postfracture compared with usual care or other interventions in all settings? Other outcomes include: a. Mortality (30-day and up to 1 year postfracture) b. Functional status c. Pain medication use; change in type and quantity d. Mental status e. Health-related quality of life f. Quality of sleep in the hospital g. Ability to participate in rehabilitation h. Return to prefracture living arrangements			

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know
i. Health services utilization			
<p><i>LOS for acute hospitalization</i> was reported in two trials (n = 326) comparing skin traction versus no traction and no significant difference was found. <i>Thirty-day mortality</i> was reported in one RCT (n = 80) that found no difference between skin and skeletal traction versus no traction. <i>Additional pain medication use</i> was reported in one RCT and one nRCT (n = 352). There was no significant difference between groups.</p>	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 3): In older adults (≥50 years) admitted to the hospital following acute hip fracture, what is the nature and frequency of adverse effects that are directly or indirectly associated with pharmacologic and nonpharmacologic pain management interventions up to 1 year postfracture compared with usual care or other interventions in all settings?			
Seven RCTs (n = 1,043) and one cohort study (n = 134) provided data on adverse effects. The reported adverse effects were from one to two studies, and did not demonstrate any significant statistical differences between the pain management interventions.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Key Question (KQ 4): In older adults (≥50 years) admitted to the hospital following acute hip fracture, how do the effectiveness and safety of pharmacologic and nonpharmacologic pain management interventions vary in differing subpopulations following acute hip fracture up to 1 year after fracture compared with usual care or other interventions in all settings?			
No data were reported.	<input type="checkbox"/>	New Evidence:	<input type="checkbox"/>
Are there new data that could inform the key questions that might not be addressed in the conclusions?			

Conclusions From CER Executive Summary	Is this conclusion almost certainly still supported by the evidence?	Has there been new evidence that may change this conclusion?	Do Not Know